Small Telescopes Assignment

This packet is to be completed over the course of the small telescopes nights. All parts require you to either sketch, fill in information, or perform a task that will be initialed by an instructor or TA. There are a few minor follow-up tasks to be completed outside of class but otherwise all work will be done during the evening class times. For the most part the tasks can be completed in any order. Please keep good track of this packet from week to week! You may store it with the telescope equipment if you're worried about losing it.

Part I: Telescope balancing and alignment

Alt-Az Mounts:

Align the Alt-Az telescope. You may need to use the star chart to determine which bright stars are up first. After you've successfully aligned, demonstrate the alignment with an instructor or TA present by slewing to an object and having the object land in the field of view (FOV). You will be allowed to center the target in the FOV, then the instructor or TA will set a 5-minute timer; you will get credit for this task if your object has not left the FOV after 5 minutes.

Instructor/TA initials here: lah
Object lands in FOV after slew: vega________
Object stays in FOV for 5 minutes after centering: vega________

Equatorial Mounts:

Balance the telescope on the Equatorial mount following the instructions. Demonstrate balance to an instructor or TA.
Align Finderscope. Successful alignment of the finderscope is confirmed by showing the same target at the center of both the telescope and finderscope fields of view; any target will suffice.
Align the telescope. Same as above the Alt-Az mounts: alignment is demonstrated by (1) slew landing the object in the FOV, and (2) tracking successful at keeping the object in the FOV for 5 minutes.

Instructor/TA initials here:
EQ telescope balance: kdk__________

Finderscope aligned: ___kdk______

Object lands in FOV after slew: kdk________

Object stays in FOV for 5 minutes after centering: kdk________

Manual Equatorial Telescopes: The task is simple but not necessarily easy: find any Messier object and keep it in the FOV for five minutes by tracking manually.

instructor/TA initials: (told to skip)

Part II: On Sky

The tasks below can be done with any mount and any eyepiece. But please indicate in each case which telescope and eyepiece you're using.

Messier objects

Which telescope and eyepiece are you using?

6" Celestron and 25mm

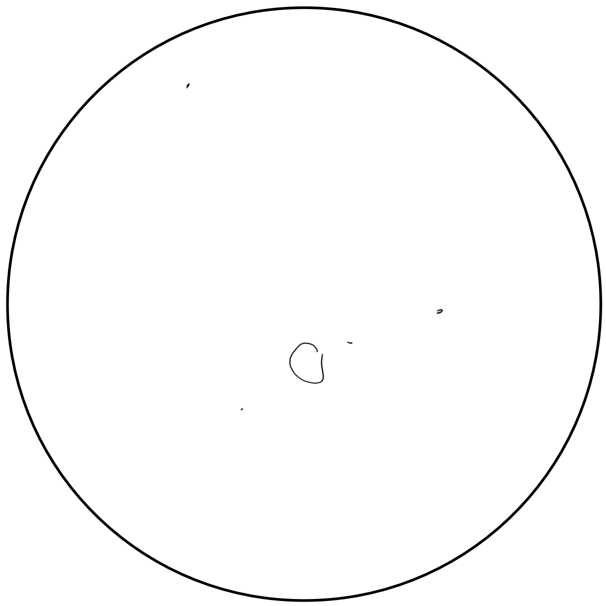
Use the star chart to determine which Messier objects are up and likely to be observable from a small telescope in Pasadena (i.e. a "bright sky" location).
Find 3 messier objects; write which ones and have an instructor/TA confirm and sign off:

1. object name: Albireo instructor/TA initials: kdk
2. object name: M 34 instructor/TA initials: qz
3. object name: M 15 instructor/TA initials: qz

Jupiter

(a)

Find Jupiter and sketch the planet and the bright objects in its vicinity. Write down the exact date and time of observation.



Date and time:

11/4 9:26

Which telescope and eyepiece are you using?

6" Celestron and 25mm

After class, bring up an image of the planet and its vicinity at the time you observed (instructions below), and use it to label the moons on your sketch.

Instructions:
Go here: https://pds-rings.seti.org/tools/
Under “Planet Viewers”, select your planet. Enter the UT date and time in the format indicated, specify the field of view, and click “Render diagram” at the bottom. All other option defaults should be ok.

(b) Using the image above, or the JPL Horizons tool, estimate the angular size of Jupiter at the time of observation:

.5"

Based on this, estimate the field of view of the eyepiece:

3°

(c) This is the *true* field of view of the eyepiece. The manufacturer provides an *apparent* field of the eyepiece which is defined by:

True Field = Apparent Field / Magnification

Use the reference information at the end of this packet to look up the apparent field. What is the magnification?

x17

The magnification relates to the focal lengths (*f*) of the telescope and eyepiece as follows:

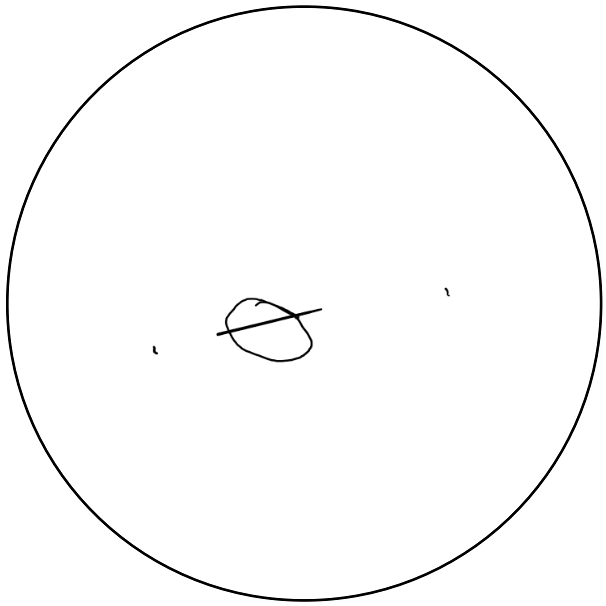
Magnification = *f* (telescope) [mm] / *f* (eyepiece) [mm]

What is the focal length of the telescope?

425 mm

Saturn

Repeat Part (a) of Jupiter tasks with Saturn. You should use the same telescope as you did for the Jupiter section, but any eyepiece will do.



Date and time:

9:32 PM 11/4

Which telescope and eyepiece are you using?

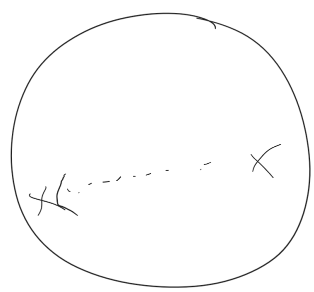
6" Celestron and 25mm

Based on your calculations in the Jupiter part, what is the magnification of the above sketch of Saturn?

x40

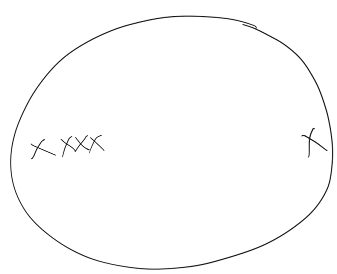
Sky Motion

Identify 3 bright stars, one close to the north star, one as far as possible, and one in between. With telescope tracking off (i.e. with the telescope off completely, or before alignment), put each at the edge of the FOV such that it drifts into the FOV over time. Measure the precise amount of time it takes from the star to pass from one edge of the FOV to the other. Draw a line that shows the direction of motion of each star through the FOV. Label with the star name and the part of the sky it's in (S, NE, NW, etc.).



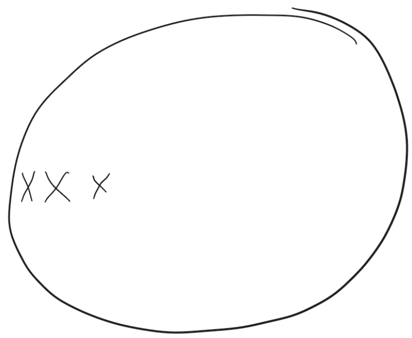
Star 1 name, location, and time to pass through FOV:

Fomalhault, SW, 2 minutes and 30 seconds to pass through FOV



Star 2 name, location, and time to pass through FOV:

Altair, W, 2 minutes and 28 seconds to pass through FOV



Star 3 name, location, and time to pass through FOV:

Gamma cepheus, N, 5 minutes and 25 seconds to pass through FOV

Based on this, is the orientation of the FOV through the telescope the same or different from what you see by eye? If different, how?

Estimate the declination of each of the three stars based on the amount of time it took to pass through the FOV. Show your work below.

Reference Information

Apparent field of view of eyepieces:
25mm: 52°
15mm: 52°
17mm: 52°
32mm: 44°
40mm: 43°