Name:
Partner(s):

ASTR110L

9 – Celestron Telescope I: Basics

Purpose: Learn to safely assemble/dissemble a 6" Celestron telescope and operate it to obtain a sharp image.
Due: At the end of class, this packet with answers to questions Q1–Q10 and two Observing Log Sheets.

Materials:
6" Celestron Telescope and case
Tripod
Silver case of eyepieces, etc.
Telescope Check-In/Out Sheet
2 Observing Log Sheets

Precautions:

This laboratory exercise differs from what you have done so far in that the goal is to train you to use a telescope. This type of lab will continue throughout the semester and will culminate with the trip to Hale Pohaku (9,000 ft up Maunakea) where you will have a chance to take images of planets, stars, nebula, and galaxies.

IMPORTANT:

Q1) Read and check the boxes below to verify you understand.

A telescope is an expensive, heavy, and fragile piece of equipment, loaded with electronic and optical parts that need to be handled very carefully. It has moving gears that allow us to follow the stars as the Earth rotates so we need to handle the heavy tube carefully at all times.

□ DO NOT LEAN ON OR APPLY FORCE TO THE OPTICAL TUBE (orange).
□ DO NOT FORCE ANY KNOB BEYOND ITS LIMIT; if it won't turn or move, do not force.

There are several mirrors and a large glass corrector at the entrance of the tube that has been coated with a special substance and shaped in a precise form to allow us to acquire sharp images.

□ DO NOT TOUCH THE CORRECTOR PLATE (top glass in the tube).

The eyepieces need to remain clean without fingerprints on them.

□ DO NOT TOUCH ANY LENSES, MIRRORS, or OTHER GLASS SURFACES and
□ DO NOT BLOW ON THE LENSES

Since the telescope stands on a tripod connected to a power line and, often, to the computer, avoid quick and jerky movements of any kind when around the telescope and equipment. Think about what you are going to do before moving and verbally verify movements with your partner. This will be especially important when we observe at night and can't see well.

□ DO NOT LEAN ON THE TRIPOD,
□ BE CAREFUL WITH CABLE, and
□ WATCH WHERE YOU AND THE TELESCOPE ARE MOVING.

For your safety, do not point at the Sun unless the instructor has cleared this activity and only using the solar filter:

□ DO NOT POINT THE TELESCOPE AT THE SUN.

Procedure:

Because this activity will allow you to work on your own for the first time, ask questions and seek help before attempting something you are not sure about.

CHECKOUT:

Q2) Record the number of your telescope equipage: _____
Complete and sign the Telescope Equipment Check-In/Out Sheet, which includes a signature from the instructor or TA signature, who will then file the form. You will always complete and submit the Check-Out Sheet when using a telescope.

Q3) Mark where the following items are stored (and how) in your telescope case by their numbers (schematic below). This will help you properly store the telescope and accessories. This will also verify you have them (see Telescope Equipment Check-In/Out Sheet regarding missing or damaged items). Record any pertinent notes (e.g., number and description of caps), especially if equipment is e.g., smudged or dysfunctional.

1. Celestron 6se Telescope with hand paddle. Note(s): _____
2. Celestron 6se Telescope manual. Note(s): _____
3. Tripod leg spacer/accessory tray. Note(s): _____
4. Bubble level (misc. bag). Note(s): _____
5. Telescope power cable(s). Note(s): _____
6. 25mm eyepiece with cap(s). Note(s): _____
7. 45° mirror with cap(s). Note(s): _____
8. Phillips-head screwdriver. Note(s): _____
9. Finder-scope (off!). Note(s): _____

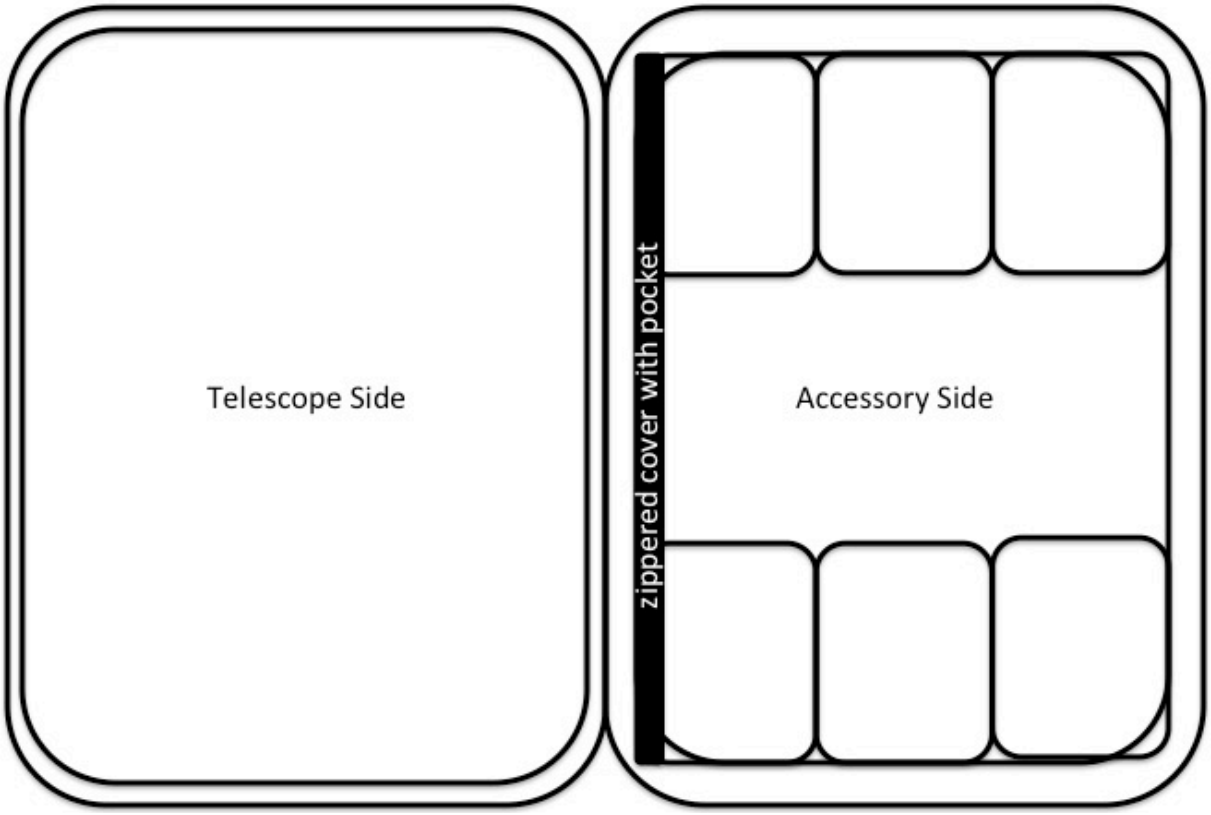

Figure 1: Schematic of the Celestron 6se Telescope case, for marking location of equipment.

TELESCOPE ASSEMBLY:
The instructor will explain how to set up the telescope and how to correctly operate it. The basic steps are:

1. Screw tripod leg spacer into tripod and extend lends to desired length. Make sure all bolts are hand tight.
2. Level tripod platform (bubble level included).
3. Carefully lift telescope onto tripod platform.
4. One partner hold telescope while other affixes it to tripod with the three bolts (hand tightened).
5. Verify the telescope is mounted properly (notch in arm should align with mirror-side plastic rim).
6. One partner hold the telescope while the other unscrews the quick-release lock. Carefully raise the telescope one-third (1/3) of the way up. Fasten it by screwing it hand tight.
7. Plug in the power cord to the telescope, wrap once around leg to secure it (if possible), and plug into outlet with the power-brick resting on a surface.
8. Turn on the telescope (power switch).
9. If not able to actually align the telescope (e.g., in the lab), scroll to "One Star Align" on the hand-paddle. Select a random star and hit 'Enter' and 'Align' at the prompts. This will release the telescope to your operation.
10. Make sure Tracking is Off.
11. Remove the front cap and store. Do not touch the corrector plate.
12. Remove the end cap and store in the tripod leg spacer/accessory tray.
13. Insert appropriate eyepiece assembly at the back-end of the telescope (e.g., 45° mirror plus 25mm eyepiece).
14. Affix the finder-scope (do not over-tighten. This strips the screws. Make sure to turn off the finder-scope when not in use.)
15. Proceed to specific lab tasks. Focus knob is at the back-end of the telescope.

QUESTIONS/TASKS:
For today's lab, set up the telescope with the 45° mirror and 25mm or 32mm eyepiece.

Q4) Point the telescope at a far object in the lab room and focus on it, making a sharp image in the 25mm or 32mm eyepiece. Record your observation on the Observing Log Sheet (label with lab, question, and details of the eyepiece, etc).

Q5) Turn on the finder-scope. Does the red dot correspond to the image of the object seen in the eyepiece? If yes, is the center of the image in the eyepiece exactly where the red dot is? If not, where is the red dot with respect to the image in the eyepiece?

Q6) Adjust the finder-scope to attempt to align the red dot exactly with the center of the image of the object. What did you have to do to make this happen or at least get close? If it doesn't work, explain what is wrong.

Q7) Without moving the telescope, change the eyepiece to a 8mm or 13mm eyepiece. Re-focus. Record what you see on a second Observing Log Sheet (label with lab, question, and details of the eyepiece, etc).

Q8) The "millimeter-age" (i.e., focal length) of the eyepiece relates to its magnification and/or field-of-view. Briefly describe how the image changed with the smaller focal-length eyepiece.

Q9) Carefully explore the telescope (e.g., hand-paddle, eyepieces). Describe one interesting thing you learn or discover (and how) that has not been covered already.

SHUTTING DOWN:
Students will properly power-off the telescope, disassemble, and return all pieces to their original storage place (including caps). This has to be done very carefully and in the correct order. The instructor and TA will be there at all times to help.

Q10) Have the instructor or TA initial that the equipment is properly stowed and that you may leave. _____